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Attorney's Docket No.: 05542-399001 / 4152/CMP

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Smith et al.
Serial No. : 09/851,185
Filed : May 7, 2001
Title : CHEMICAL MECHANICAL POLISHER WITH GROOVED BELT

Art Unit : 3723
Examiner : Shantese McDonald

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT IN REPLY TO ACTION OF MARCH 12, 2004

Please amend the above-identified application as follows:

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CERTIFICATE OF MAILING BY FIRST CLASS MAIL

I hereby certify under 37 CFR §1.8(a) that this correspondence is being deposited with the United States Postal Service as first class mail with sufficient postage on the date indicated below and is addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

June 8, 2004
Date of Deposit

Carlos A. Brasil
Signature

Carlos A. Brasil
Typed or Printed Name of Person Signing Certificate

Please replace the paragraph beginning at page 5, line number 8, with the following amended paragraph:

A backing assembly ~~52~~62 (shown in phantom in Figure 1) is positioned adjacent to the belt 60 at a location directly opposite to the polishing head 40. The moving belt is sandwiched between the polishing head 40 and the membrane backing assembly ~~52~~62. The backing assembly ~~52~~62 assists in providing a uniform contact pressure between the belt 60 and the substrate. A conformable plate (not shown) can be molded over the top of the backing assembly ~~52~~62. In addition, to reduce or eliminate wear between the bottom of the belt 60 and the backing assembly ~~52~~62, a pressurized fluid of either gas or liquid is provided through holes to create a fluid bearing. The fluid or gas creating this layer is continuously replenished so that the thickness of the layer remains generally constant as the liquid or gas escapes sideways.

Please replace the paragraph beginning at page 5, line number 30, with the following amended paragraph:

Referring to Figures 2 and 3, the polishing belt 60 can be composed of a layer ~~62~~ of polyurethane or polyurethane mixed with a filler. The polishing belt has a roughened durable polishing surface 64. The polishing belt 60 can also include a second layer ~~66~~ of a more compressible or flexible material bonded to an lower surface of the polyurethane layer ~~62~~.

Please replace the paragraph beginning at page 7, line number 1, with the following amended paragraph:

The grooves 100 also have a depth Dg of at least about 0.02 inches. The depth Dg can be between about 0.02 and 0.05 inches. Specifically, the depth Dg of the grooves can be approximately 0.03 inches. Upper layer ~~36~~ can have a thickness T between about 0.06 and 0.12 inches. As such, the thickness T can be about 0.07 inches. The thickness T should be selected so that the distance Dp between the bottom of base portion 106 and lower layer ~~38~~ is between about 0.035 and 0.085 inches. Specifically, the distance Dp can be about 0.04 inches. If the distance

Dp is too small, the polishing pad will be too flexible. On the other hand, if the distance Dp is too large, the polishing pad will be thick and, consequently, more expensive.

Please replace the paragraph beginning at page 7, line number 23, with the following amended paragraph:

In addition, some or all of the grooves can end before the edge of the polishing belt. For example, referring to FIG. 4C, grooves 224 and 226 are oriented perpendicular to the direction of motion of the polishing pad. Grooves 224 extend to the edge of the pad, whereas grooves ~~225~~226 do not. Two portions along the opposite edges of the belt can be entirely free of grooves.

Please replace the paragraph beginning at page 7, line number 28, with the following amended paragraph:

Referring to FIG. 5, in another implementation, a set of arcuate grooves 230 are disposed in the polishing surface 64 of the polishing belt 60. The arcuate grooves 230 can be bowed away from the direction of motion (shown by arrow A) of the polishing belt. The arcuate grooves ~~300~~230 can be generally equidistant, with the pitch, width and depth described for the implementation of FIG. 2. However, in the implementation of FIG. 5, the curved shape of the groove counteracts the forces that tend to urge the slurry toward and off the edge of the polishing pad. Thus, the curved grooves ~~64~~230 tend to retain more slurry and, consequently, less slurry needs to be supplied to the polishing pad, thereby reducing the cost of consumables for the polishing machine. These grooves can also be discontinuous and do not need to extend to the edge of the polishing pad.